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ABSTRACT

The purpose of this study was to develop a reliable and valid measurement for the identification of Internet addictive high school students. There were 615 subjects selected by a stratified sampling from the population of Taiwanese 10th to 12th graders. The final version of the Internet Addiction Scale for Taiwan High Schoolers (IAST) contained 20 items that were grouped into five factors: (1) Compulsive Use/Withdrawal; (2) Tolerance; (3) Related Problems: Resource Management; (4) Related Problems: Family/Health/Learning; and (5) Negation. The reliability of the scale as a whole and the subscales was satisfactory. Total scores of IAST demonstrated a normal distribution. Addicts classified by IAST showed a heavier usage in more Internet applications and perceived more negative influence of Internet toward their life than the addicts identified by a previous study and the non-addicts. The usage of the Internet negatively influenced life routines, health, parental relationship, and school achievement of the addicts. However, their teacher and peer relations were enhanced by the Internet use. The three most frequently-used Internet applications of the addicts were: the World Wide Web (5.79 hours/week), Bulletin Board Systems (3.85 hours/week), and chat rooms (3.61 hours/week). (Contains 11 references.) (Author/MES)

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Internet Addiction among High Schoolers in Taiwan

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Abstract

The purpose of this study was to develop a reliable and valid measurement for the identification of Internet addictive high school students. There were 615 subjects selected by a stratified sampling from the population of Taiwan high school students, 10th to 12th graders. The final version of Internet Addiction Scale for Taiwan High Schoolers, IAST, contained 20 items which were grouped into 5 factors, Compulsive Use/Withdrawal, Tolerance, Related problems: Resource Management, Related Problems: Family/Health/Learning, and Negation. The reliabilities of the scale as a whole and the subscales were satisfactory. Total scores of IAST demonstrated a normal distribution. Addicts classified by ISAT showed a heavier usage in more Internet applications and perceived more negative influences of Internet toward their life than the addicts identified by Young (1996) and the non-addicts. The usage of Internet negatively influenced life routines, health, parental relationship, and school achievement of the addicts. However, their teacher and peer relations were enhanced by the Internet use. Three most frequent-used Internet applications of the addicts were listed in sequence: WWW (5.79 hours/per week), BBS (3.85 hr/pw), Chat Rooms/IRC (3.61hr/pw).

Research Purpose

Recently Internet has become a popular media for personal and mass communication as well as a commercial tool. Taiwan government has played an important role in the promotion of Internet usage. The intention is to cultivate Taiwan's international competition capacities in economics and education. However, several studies have called for policy makers and educators' attention about negative influences of the Internet, especially inadequate use, abuse of the Internet, the related physical and psychological problems, and some resulted harmful consequences toward significant others (Brenner, 1996, 1997; Goldberg, 1996; Griffth, 1998; Shtton, 1991; Young, 1997, 1998; Young & Rogers, 1998).

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Several researchers in Taiwan (e.g. Chen, 1998; Chou, Chou, & Tyan, 1999) found that a small amount of Taiwan college students did show an excessive use of the Internet (about 20 hours per week) and the results were very similar to those in the USA and Europe. These college students may skip meals, decrease sleeping and study time, rearrange daily routines, and avoid interpersonal interaction, just to save more time for more involvement on the Internet. The Internet addicts identified by the previous studies were mostly young adults. Several universities has started to aware students' abuse or problematic behaviors of Internet (Kandell, 1998). However, such alert has not yet taken by high schools or parents of high school students.

Because of fast spread of the Internet in the past three years, Internet has become much more accessible by high school students in Taiwan. Therefore it is reasonable to infer some of the high school students may likely become problematic users of the Internet. This study intended to explore the Internet problematic behaviors among students younger than the subjects in the past studies. This study is the first one to explore the Internet addiction of high school students. A questionnaire was developed to measure high school students' problematic Internet behaviors in Taiwan. The reliability and validity of the measurement was examined. The Internet addicts were identified and the demographic information and the Internet pathological use patterns were reported.

Research Perspectives

Internet addiction has newly documented by an increasing amount of research. Though the term, addiction, is not listed in the DSM-IV (APA, 1994), researchers have indicated a set of criteria for diagnosis of the Internet addiction. Goldberg (1996) identified seven major diagnostic criteria for the Internet addicts. Brenner (1996, 1997) developed a checklist (IRABC) as the primary measurement tool to identify the Internet addicts. Young (1996, 1997) adopted an eight-item questionnaire and classified 396 users as the Internet dependents. Of all disorders listed in DSM-IV, Young (1996) suggested the compulsive gambling as the most akin to the Internet addiction.

From previous studies, the most common diagnosis criteria for Internet addicts are compulsive behaviors, withdrawal, tolerance, and impaired social or personal functions. Compulsive use of Internet describes the uncontrollable nature in increasing the amount of time spent on-line. Withdrawal depicts the difficulty to cut back from Internet dependence. Tolerance describes a user's heavier Internet usage in order to achieve satisfaction one gets in his/her initial on-line experience. The examples of impaired social or personal functions include the avoidance of social interaction with real person or skipping meals so as to involve more time on-line.

Research Questions

1. Is the Internet Addiction Scale for Taiwan Higher Schoolers (IAST) a valid and reliable measurement? Is the IAST as valid as Young's identification index?

2. How to describe Internet addictive high school students' problematic use of Internet and the influences of the Internet on their life?

Methods

Subjects

Six hundred and fifteen subjects were selected from 1998 high-school students in Taiwan. The population was stratified into three demographic areas, Northern, Central, and Southern Taiwan. Eight schools were selected from the three areas. For each school, 2 to 3 classes were randomly selected to form the subject pool. Among the respondents, 73% were boys and 27% girls. Twenty two percent of the respondents were in the 10th grade, 55% in the 11th grade, and 23% in the 12th grade. Their Internet experiences were primitive, as 48% with less than 1-year experience on-line, 35% between 1 to 2 years, 12% between 2 to 3 years, and only 5% with experience more than 5 years.

Procedures

The present study developed an "Internet Addiction Scale for Taiwan High Schoolers"(IAST) and collected respondents' basic information such as gender, Internet experience, and applications. Respondents also answered the 8-item questionnaire developed and validated by Young (1996) which served as a validity criterion. From September to October 1998, formal scales were distributed to the sample schools.

Measurements

The IAST was developed with 4 hypothetical dimensions, Compulsive Use, Withdrawal, Tolerance, and Related Problematic Consequences. In the subscale of Compulsive Use, a typical question noted: "Though I plan to use the Internet for just a while, I stay on-line longer than originally intended." An item of the Withdrawal subscale stated: "When I tried to cut down or stop Internet use, I felt anxious." The example of Tolerance subscale described: "Comparing with the time I got to know internet, now I have to search more exciting information in order to achieve the original satisfaction." The Related Problematic Consequences of Internet addicts include problems with family, school learning, finance, and health. The typical question stated: "Because of my Internet use the on-line service charges of my family were significantly increased."

The results of a factor analysis showed that 5 factors were extracted, accounted for 53.7% of

total variance. The subjects demonstrated similar responses in Compulsive Use and Withdrawal, so the items of these dimensions were grouped together and thus named as Compulsive Use/Withdrawal, the first factor. Other factors were listed in the descending sequence of total variance explained, Tolerance, Related problems: Resource Management, Related problems: Family/Health/Learning, and Negation. The fifth factor was designated as "Negation". Two negative statements original designed as items in compulsive behavior subscale were relocated; e.g. "I switched to other works comfortably if the line was busy keeping me off-line." The results of the reliability and factor analysis are summarized in Table 1.

Table 1: The results of reliability and factor analysis of IAST.

Factors	# of items	% of Variance Explained (after rotation)	Reliability α
1. Compulsive Use/ Withdrawal	7	16.37	.80
2. Tolerance	5	12.41	.71
3. Related Problems: Resource Management	3	9.15	.63
4. Related problems: Family, Health/ Learning	3	9.13	.57
5. Negation	2	6.63	.42
Total	20	53.70	.85

In the examination of criterion-related validity, the IAST and Young's questionnaire was highly correlated ($r = .62$, $p < .000$). Furthermore, high scorers (upper 10%) in IAST reported to spend more time on-line.

Results

Internet Addicts Identified by IAST and Young's Index

Two pools of possible internet-addicts were sorted out. The first pool was selected according to Young's 8 classification index, responding positively in 5 and more items ($N = 67$). The second pool was filtered by IAST to include upper 10% scorers ($N = 61$). Table 2 shows time- spent on 7 kinds of Internet applications (BBS, Chat Rooms/IRC, Email, ftp, Net Games/MUD, Newsgroup, and WWW) for Internet addicts and non-addicts identified by both measurements.

Internet usage of Addicts and Non-addicts

For addicts and non-addicts identified by Young's index, time-usage differences were significant on four of seven Internet applications, e. i., BBS, Chat Rooms/IRC, Email, and ftp. However, six of seven time-usage comparisons were significant for the addicts and non-addicts identified by the IAST. Internet addicts and non-addicts showed no difference of time-spent on Newsgroup that is relatively not popular in Taiwan.

In Table 2, the most frequent used Internet applications for addictive high school students were listed in descending sequence, WWW (5.79 hours/per week), BBS (3.85 hr/pw), Chat Rooms/IRC (3.61hr/pw), FTP (2.73 hr/pw), Net games/MUD (2.04hr/pw), Email (1.77hr/pw). The results are similar to the findings of Brenner (1997) on American adults (21 hr/pw), and both studies of Chen (1998) and Chou, Chou, & Tyan (1999) on Taiwan college students (19 hr/pw, and 23 hr/pw respectively). In Taiwan, high school students have to go through a very competitive entrance examination, so ordinarily they are engaged in excessive long learning. The Internet addicts reported that the time spent on-line is relatively long according to high students' tight learning schedule.

Table 2: Amounts of time (mean hours) allocated to the Internet applications for addicts and non-addicts classified by Young's index and IAST

Internet Applications	Non-Addicts	Addicts	Non-Addicts	Addicts
	Young's Index		IAST	
BBS	1.37	2.16 *	1.15	3.85 **
Chat Rooms / IRC	1.22	2.68 **	1.08	3.61 *
E mail	0.89	1.58 *	0.87	1.77 *
Ftp	0.98	1.59 *	0.83	2.73 *
Net Games / MUD	1.17	1.88	1.13	2.04 *
Newsgroup	0.51	0.93	0.53	0.73
WWW	3.15	3.62	2.88	5.79 **

* $p < .05$ ** $p < .01$

Internet Influence of life for Addicts and Non-addicts

There are six possible ways that the Internet may show its influences, i.e., daily routines, health, parental relations (with the subject), peer relations, school learning, and teacher relations. For the six Internet influences, there was only one significant difference, parent relations,

between the Internet addicts (3.97) and non-addicts (3.43) identified by Young's index. Because an eight-point scale was used where 1 represents positive influence while 8, negative influence, therefore both addicts and non-addicts reported positive Internet influence toward their parental relationships.

The IAST addicts reported relatively negative Internet influences in every aspects of their life except peer and teacher relations (mean = 2.83 and 3.79). The Internet addicts sorted by IAST reported significant negative influences of Internet toward their daily routines, health, parental relations, and school learning.

Table 3: Self-reported influences of Internet by total sample and 2 groups of addicts (1—positive influence to 8—negative influence)

Internet Influences	Non-Addicts Young's Index	Addicts Young's Index	Non-Addicts IAST	Addicts IAST
Daily routines	3.74	4.27	3.67	4.89**
Health	3.50	3.76	3.46	4.17*
Parental relations	3.43	3.97*	3.41	4.42**
Peer relations	2.70	2.92	2.72	2.83
School learning	3.56	4.26	3.52	4.64**
Teacher relations	3.33	3.53	3.33	3.79*

* $p < .05$ ** $p < .01$

Conclusions

In this study a questionnaire, Internet Addiction Scale for Taiwan High Schoolers (IAST), was designed and examined its reliability and validity. The main findings supported that 20-item IAST is a reliable scale with adequate factor models. The five factors were named Compulsive Use/ Withdrawal, Tolerance, Related Problems: Resource management, Related Problems: Family/Health/Learning, and Negation, that accounted for 54% of total variance.

In further examination of criterion validity, the Internet addicts selected by IAST displayed a heavier Internet usage than those identified by Young's index and the rest people in the sample. Also the Internet addicts selected by IAST reported more significant negative Internet influences toward their life, such as daily routines, health, parental relations, and school learning, than those identified by Young's index and the rest people in the sample. Therefore, IAST is a proper

measurement tool in studying Internet problematic users in Taiwan.

About 10% of high school students (61 out of 615 people) could be categorized as Internet problematic users. The average time the addictive high students spent on-line is similar to the findings of Brenner (1997) on American adults (21 hr/pw), and both studies of Chen (1998) and Chou, Chou, & Tyan (1999) on Taiwan college students (19 hr/pw, and 23 hr/pw respectively). If one take the effect of a nationwide entrance examination for college and the tight school schedule of a Taiwan high school student into account, these problematic users did spend a substantial if not total percentage of their free time.

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